

WHAT WE CLAIM IS:

1. A shaftless rotor which includes at least two recessed portions wherein the portions are shaped to enable the rotor to rotate by the application of fluid flow to the rotor, and wherein the centre of mass of the rotor is substantially at the centre of the volume of space occupied by the rotor.
2. A rotor as claimed in claim 1 wherein at least one recessed portion includes at least one curved surface.
3. A rotor as claimed in claim 1 comprising:

two recessed portions, one on each side of the rotor with;

an approximately cylindrical central portion therebetween, said central portion having an arcuate outer surface, and being formed as a continuous band around the circumference of the rotor; and,

two tip regions, one on either side of a recessed portion, remote from the central portion.
4. A rotor as claimed in claim 1 wherein the mass of the or each recessed portion are balanced during manufacture for control so as to place the centre of mass of the rotor at a point substantially in the centre of the volume of space occupied by the rotor.
5. A rotor as claimed in claim 1 which includes at least one magnet.
6. A rotor as claimed in claim 5, which incorporates at least one magnet and, wherein said magnet is offset from the centre of mass of the rotor.
7. A rotor as claimed in claim 5, wherein the magnet is formed from materials including neodymium iron boron (NdFeB).

8. A rotor as claimed in claim 1 wherein the rotor is covered by a protective coating.
9. A rotor as claimed in claim 8 wherein the protective coating is selected from the group including: flat black modified phenolic coatings; aluminium chromate IVD; nickel plating; ceramic coatings; epoxy resins; magnesium; tantalum; and combinations thereof.
10. A rotor as claimed in claim 1, wherein the rotor is adapted to rotate about a single axis of rotation orientated substantially through the centre of mass of the rotor.
11. A rotor as claimed in claim 1 wherein the rotor is substantially contained within a portion of the housing.
12. A rotor within a housing as claimed in claim 11 wherein the housing includes at least one magnetic field generating element.
13. A rotor within a housing as claimed in claim 12, which includes an electrical conductor in close proximity to the exterior of the rotor housing.
14. An energy transfer apparatus which in use includes:
 - (a) at least one rotor and rotor housing as claimed in claim 13,
 - (b) at least one recessed portion of the rotor is adapted to temporarily cup or collect fluid elements,
 - (c) a driving fluid element or elements,
 - (d) a magnet or magnets fixed within the rotor which rotate as the rotor rotates,

and wherein the rotating magnet or magnets induce an electrical current in the conductor.

15. An energy transfer apparatus as claimed in claim 14 wherein the housing incorporates one or more fluid element inlet ports and one or more fluid element outlet ports.
16. An energy transfer apparatus as claimed in claim 15 wherein the, or each inlet port introduces fluid elements into the interior of the housing in a direction eccentric in the transverse plane to the axis of the rotor.
17. An energy transfer apparatus as claimed in claim 14 wherein the housing includes an inlet port and an outlet port set, each in positions selected from:
 - (a) both ports on the same side of the housing as one another; or,
 - (b) each port on opposite sides of the housing as one another; or,
 - (c) both ports are on a 90 degree angles to each other.
18. An energy transfer apparatus incorporating at least two apparatus as claimed claim 14 wherein the apparatus are arranged in a configuration selected from: in series; in parallel; and combinations thereof.
19. A filtration apparatus which in use includes at least one rotor, or rotor and rotor housing, as claimed in claim 1, wherein at least one recessed portion of the rotor is adapted to temporarily cup or collect fluid elements.
20. A filtration apparatus as claimed in claim 18 wherein the housing incorporates one or more fluid element inlet ports and one or more fluid element outlet ports.
21. A filtration apparatus as claimed in claim 19 wherein the inlet port introduces fluid elements into the interior of the housing in a direction eccentric in the transverse plane to the axis of the rotor.
22. A filtration apparatus as claimed in claim 18 wherein the housing includes an inlet port and an outlet port set, each in positions selected from:
 - (a) both ports on the same side of the housing as one another; or,
 - (b) each port on opposite sides of the housing as one another; or,

(c) both ports are on a 90 degree angles to each other.

23. A filtration apparatus as claimed in claim 18 wherein the fluid element is selected from the group including: a fuel; water; a waste material.
24. A combination apparatus that incorporates an energy transfer apparatus as claimed in claim 14 wherein the apparatus is characterised by a common rotor.
25. A filtration apparatus as claimed in claim 18 wherein the apparatus is characterised by a common rotor.